

### **REMARKS**

Entry of the foregoing and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

Claims 1, 3-11, 13, 21, 27-32 and 34 are pending. Claims 1, 3-11, 13, 21, and 27-32 have each been amended and claim 34 has been added by the present amendment.

### **CLAIM AMENDMENTS**

Claim 1 has been amended to express "A system combination" and "the system combination consisting of three operational units" and corresponding editorial changes. An operational unit being a unit actively involved in the purification of exhaust gas.

This amendment is meant to express that the system combination has only three active components, i.e., the NO<sub>x</sub> adsorption catalyst, the oxidation catalyst, and the particle separator. The "consisting of" language of claim 1 refers only to operational units, and does not preclude the inclusion of additional non-operation units. Recitations to the structural arrangement appear in claim 1 with regard to the arrangement of the three operational units and appear in claims 5, 6, 10, 31, and 32, e.g., the recitations to exhaust gas discharge lines. In claim 10, the NO<sub>x</sub> adsorption catalyst is arranged in each exhaust gas discharge line, thus one unit is arranged in parallel. However, these recitations are independent of, yet consistent with, the "consisting of" language of claim 1.

Claims 3-10, 13, 21, 27, 28, and 30-32 have been amended to make simple editorial changes to maintain language consistency with amended claim 1.

Claim 11 includes the above discussed simple editorial changes and also has been amended to include "the system combination is adapted to enable" and "with a  $\lambda$  value below 1.2 in order."

Claim 29 includes the above discussed simple editorial changes and also has been edited to simply clarify that "the NO<sub>x</sub> adsorption catalyst is arranged as a first operation unit in the flow direction of the exhaust gas."

Support for the foregoing amendments can be found, for example, at least throughout the specification.

### ***CLAIM OBJECTIONS***

Claim 5 stands objected to by the Office. According to the Office's suggestion, "are" was changed to "is." Therefore, applicant respectfully requests that the objection be withdrawn.

### ***CLAIM REJECTIONS UNDER 35 U.S.C. §112***

Claim 11 stands rejected under 35 U.S.C. §112, second paragraph, on the grounds set forth in paragraph 3 of the Official Action.

By the present response, applicant has amended claim 11 in a manner which addresses the above-noted rejection. Namely, applicant has amended claim 11 to recite "The system combination of claim 1, wherein the system combination is adapted to enable the mixing ratio of the engine to be periodically adjusted from a lean mixture to a rich mixture with a  $\lambda$  value below 1.2 in order to regenerate sulfates, nitrates, and particles."

Claim 11 recites a positive limitation on the type of system combination, i.e., one that is adapted to enable the mixing ratio of the engine to be periodically adjusted from a lean mixture to a rich mixture with a  $\lambda$  value below 1.2 in order to regenerate sulfates, nitrates, and particles. While using functional language, the claim itself also is structural in that this limitation is a feature of the type of system combination.

The Office also asserts that the regeneration of "sulfates", "nitrates", and "particles" have no clear antecedent basis. However, no antecedent basis is necessary. The terms are new to claim 11. That they are "regenerated" may be causing the antecedent basis issue for the Office. However, "regenerated" refers to the regeneration of the claimed items from at least one of the three operational units. The system is one "for the purifying a flow of exhaust gases." *See claim 1*. Thus, regeneration simply means that the claimed items are desorbed/released from at least one of the three operational units. As claim 11 properly recites a "system combination adapted to" it is proper to address regenerating the claimed items from

at least one of the three operational units which would have adsorbed/collected them.

Based on the above, reconsideration and withdrawal of the rejection of claim 11 is respectfully requested.

***CLAIM REJECTIONS UNDER 35 U.S.C. §103***

Claims 1, 8-9, 27-28 and 30 stand rejected under 35 U.S.C. §102(b) as being anticipated by WO 00/21647 (hereafter "WO '647") on the grounds set forth in paragraph 5 of the Official Action. Applicant respectfully traverses this rejection.

Claim 1, the only independent claim at issue here, recites that the system combination consists of three operational units:

- 1) a NO<sub>x</sub> adsorption catalyst;
- 2) an oxidation catalyst effective to promote oxidation of NO to NO<sub>2</sub> during said lean mixing ratio; and
- 3) a particle separator,

WO '647 does not anticipate the presently claimed invention because WO '647 discloses a combination of four operational units including, in sequence:

- 1<sup>st</sup> unit) catalyst to oxidize NO to NO<sub>2</sub> (NO oxidation catalyst - 14 in Figure 1);
- 2<sup>nd</sup> unit) a filter (PF - 16 in Figure 1);
- 3<sup>rd</sup> unit) a NO<sub>x</sub> adsorber (NO<sub>x</sub> trap - 28 in Figure 1); and
- 4<sup>th</sup> unit) a three-way catalyst (TWC - 30 in Figure 1).

Thus, comparing claim 1 to WO '647 it can be seen that claim 1 recites a specific closed group of three operational units in the combination – namely, a NO<sub>x</sub> adsorption catalyst, an oxidation catalyst effective to promote oxidation of at least NO to NO<sub>2</sub>; and a particle separator. In contrast to claim 1, WO '647 includes four operational units. Figure 1 illustrates these four units as oxidation catalyst 14, filter 16, NO<sub>x</sub> absorber 28 and 3-way catalyst 30. Thus, in view of the closed language associated with the combination of operational units, WO '647 does not meet the claim feature of a system combination consisting of three operational units.

Furthermore, comparing claim 1 to WO '647 it can be seen that claim 1 recites that the NO<sub>x</sub> adsorption catalyst is arranged before said oxidation catalyst or the NO<sub>x</sub> adsorption catalyst is arranged in the same structure with the oxidation catalyst. However, in contrast to claim 1, WO '647 arranges the operational units in a different sequence from claim 1. As seen in Figure 1, the units of WO '647 arranged in the

flow direction are oxidation catalyst 14, filter 16, NOx absorber 28 and 3-way catalyst 30. For at least this further reason, withdrawal of the rejection is respectfully requested.

Thus, the rejection has not established anticipation because the reference does not disclose, teach or suggest all of the claimed features. For at least this reason, withdrawal of the rejection is respectfully requested.

In the Office Action of February 18, 2005, the Office asserted that "Although WO 00/21647 includes other elements, such as a catalyst 30, it would have been obvious to one having ordinary skill in the art to eliminate the catalyst 30 [4<sup>th</sup> unit - 3 way catalyst] of WO 00/21647 to reduce the cost of an additional unit while producing a system which is capable of performing the same function since the system already contains a catalyst in the oxidation catalyst 14 [1<sup>st</sup> unit], or in the adsorption catalyst 28 [3<sup>rd</sup> unit]."

First, applicant asserts that the Office's alleged motivation to modify the reference is improper. The Office points to nothing in the art to provide a suggestion or motivation to remove a unit from WO '647. The Office ignores that WO '647 does not disclose catalyst 30 [4<sup>th</sup> unit - 3 way catalyst] as an optional unit. The Office ignores that catalyst 30 [4<sup>th</sup> unit - 3 way catalyst] appears to be necessary for proper functioning of the system of WO '647. Instead the Office creates a motivation alleging that the "extra" unit would be costly and thus one skilled in the art would choose not to use it. However, cost is not discussed in WO '647, instead WO '647 is focused on proper emissions control, for which one skilled in the art deemed necessary catalyst 30 (4<sup>th</sup> unit) for the system in WO '647. Thus, applicant respectfully asserts that there is no motivation in WO '647 or the cited art for one skilled in the art to modify the disclosure in WO '647 to remove one of the disclosed operational units.

"The consistent criterion for determination of obviousness is whether the prior art would have suggested to one skilled in the art that this process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. ... Both the suggestion and the expectation of success must be found in the prior art, not in the applicant's disclosure." *In re Dow Chemical Co.*, 837 F.2d 469

(Fed. Cir. 1989). Here, the Office has pointed to no legitimate suggestion or expectation of success in the prior art. Thus, the assertion of obviousness is improper.

The Office further alleges that "it would have been obvious to one skilled in the art ... to select the appropriate arrangement for the units since positioning the parts of the apparatus is no more than a design choice, and well within the knowledge of one skilled in the art ... absence showing any unexpected results and since it has been held that rearranging parts of an invention involves only routine skill in the art."

First, the Office makes assertions about the effects of design change with no factual support and asserts no motivation. The Office is both removing a non-optional element (unit 4) and changing the order of the remaining units and still asserts that this is nothing more than design choice. Applicant respectfully traverses this allegation.

As stated above, "Both the suggestion and the expectation of success must be found in the prior art, not in the applicant's disclosure." *In re Dow Chemical Co.*, 837 F.2d 469 (Fed. Cir. 1989). Here the Office has pointed to no suggestion or expectation of success in the prior art and has, instead, simply stated that it would be no more than a design choice. Applicants respectfully assert that the removal of a non-optional unit and the rearrangement of the remaining parts is more than design choice and, thus, not obvious to one skilled in the art. This is two step manipulation and the Office has shown no motivation or suggestion in the cited art to make such drastic manipulations in order to arrive at the presently claimed invention.

Moreover, the finding of "obvious design choice" is precluded where the claimed structure and the function it performs are different from the prior art. *In re Chu*, 36 USPQ2d 1089, 1095 (Fed. Cir. 1995). Here, the removal of the catalyst 30 (4<sup>th</sup> unit) disclosed in WO '647 and rearrangement of the remaining units disclosed in WO '647 results in a different structure with a function that performs different from the cited art.

The claimed arrangement of the three listed units provides unique results when such a system is in operation. Such an arrangement allows for the periodical

adjustment of the mixing ratio with unique results. The presently claimed arrangement may be used for at least three purposes, regeneration of nitrates, sulfates and particles from the three listed units. For example, if the NO<sub>x</sub> adsorption catalyst is before the other units, regeneration of the NO<sub>x</sub> adsorption catalyst is improved. If the particle separator is before the oxidation catalyst or the NO<sub>x</sub> adsorption catalyst, regeneration of the particle separator is improved. Thus, the presently claimed arrangement provides improved regeneration while controlling emissions during the regeneration process.

The modified (by the Office to remove the catalyst 30) system in WO '647 has the order of 1) oxidation catalyst, 2) filter, and 3) NO<sub>x</sub> adsorption catalyst which does not provide the benefits of the present invention. With regards to regeneration, with the NO<sub>x</sub> adsorption catalyst as the last unit, it is difficult for a short enrichment peak (usually less than 5 seconds, more typically less than 1 sec) to reach the NO<sub>x</sub> adsorption catalyst because the enrichment pulse is muted as the exhaust fumes pass through the oxidation catalyst and the particle filter.

Further, as demonstrated in Example 2 of the present application, with cylinder specific enrichment, the presently claimed arrangement can prevent HC and CO emissions, even when NO<sub>x</sub> are reduced on one line from the NO<sub>x</sub> adsorption catalyst. When the other cylinder/parallel lines are lean (regular), HC and CO can still be oxidized on the oxidation catalyst. This is not possible in the arrangement of the modified (by the Office to remove the catalyst 30) system in WO '647. Thus, as recited by the Federal Circuit in *In re Chu*, the finding of "obvious design choice" is precluded here because the removal of the catalyst 30 (4<sup>th</sup> unit) disclosed in WO '647 and rearrangement of the remaining units disclosed in WO '647 results in a different structure with a function that performs different from the cited art; regeneration of nitrates, sulfates and particles.

The remaining rejected claims depend either directly or indirectly from independent claim 1 and distinguish over the disclosure in WO '647, for at least the same reasons as outlined above. Withdrawal of the rejection of these dependent claims is respectfully requested.

Claims 3-4 and 29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *WO '647* on the grounds set forth in paragraph 8 of the Official Action. For at least the reasons noted above, this rejection should be withdrawn.

Claims 5-7, 10, 13, 21, 31 and 32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *WO '647* in view of U.S. Patent No. 4,887,427 to Shinzawa et al. (hereafter "*Shinzawa et al.*") or DE 3,518,756 (hereafter "*DE '756*") on the grounds set forth in paragraph 9 of the Official Action.

Also, Claim 11 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *WO '647* in view of *Shinzawa et al.* or *DE '756* as applied to claim 10 above and further in view of EP 758,713 (hereafter "*EP '713*") on the grounds set forth in paragraph 10 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The rejected claims depend either directly or indirectly from independent claim 1. However, the secondary references cited here do not contribute to overcome the deficiencies associated with the primary reference, *WO '647*.

For example, *Shinzawa et al.* discloses a catalyst equipped filter 50a-50d arranged in each of four branches of a manifold 12 and additional catalyst equipped filters 14 and 15 arranged in series in an exhaust gas passage downstream of the manifold 12 (see Fig. 4 and col. 12, lines 11-38). *Shinzawa et al.* does not disclose the claimed combination of three operational units nor does it disclose the claimed order of such units. Therefore, *Shinzawa et al.* does not contribute to overcome the above noted deficiency in *WO '647*, nor in combination with the other references does it contribute to establish prima facie obviousness.

Also, *DE '756* discloses an exhaust pipe with a catalyser. However, such disclosure does not contribute to overcome the above-noted deficiencies in the other references with respect to the present claim 1.

In addition, *EP '713* discloses, in order in the flow direction, an oxidizing catalyst 5, a filter 7 and a NOx absorbent 9 (See, for example, Fig. 1). *EP '713* does not disclose the claimed order of such units. In combination with the other noted references, it is respectfully asserted that no motivation has been shown to make the proposed modifications. Indeed, there is no showing as to why one of ordinary skill

would be motivated to remove an operational unit from *WO '647* and why one of ordinary skill would be motivated to rearrange the order of the units. Since the order of the units is an outcome determinative variable (in that it effects the operation of the system), it is not merely a matter of design choice, which is more appropriately a motivation where the variable is not outcome determinative, as asserted by the Examiner. See *In re Chu*. Therefore, *EP '713* does not contribute to overcome the above noted deficiency in *WO '647*, nor in combination with the other references does it contribute to establish prima facie obviousness.

Based on the above, withdrawal of the rejection is respectfully requested.

Claim 1, 3-5, 8-9, 11 and 27-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *EP '713* on the grounds set forth in paragraph 11 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

*EP '713* discloses, in order in the flow direction, an oxidizing catalyst 5, a filter 7 and a NO<sub>x</sub> absorbent 9 (See, for example, Fig. 1). *EP '713* does not disclose the claimed order of such units.

The finding of "obvious design choice" is precluded where the claimed structure and the function it performs are different from the prior art. *In re Chu*, 36 USPQ2d 1089, 1095 (Fed. Cir. 1995). Here, the rearrangement of the units disclosed in *EP '713* results in a different structure with a function that performs different from the cited art.

The claimed arrangement of the three listed units provides unique results when such a system is in operation. Such an arrangement allows for the periodical adjustment of the mixing ratio with unique results. The presently claimed arrangement may be used for at least three purposes, regeneration of nitrates, sulfates and particles from the three listed units. For example, if the NO<sub>x</sub> adsorption catalyst is before the other units, regeneration of the NO<sub>x</sub> adsorption catalyst is improved. If the particle separator is before the oxidation catalyst or the NO<sub>x</sub> adsorption catalyst, regeneration of the particle separator is improved. Thus, the presently claimed arrangement provides improved regeneration while controlling emissions during the regeneration process.



The system in *EP '713* has the order of 1) oxidation catalyst, 2) filter, and 3) NO<sub>x</sub> adsorption catalyst which does not provide the benefits of the present invention. With regards to regeneration, with the NO<sub>x</sub> adsorption catalyst as the last unit, it is difficult for a short enrichment peak (usually less than 5 seconds, more typically less than 1 sec) to reach the NO<sub>x</sub> adsorption catalyst because the enrichment pulse is muted as the exhaust fumes pass through the oxidation catalyst and the particle filter.

Further, as demonstrated in Example 2 of the present application, with cylinder specific enrichment, the presently claimed arrangement can prevent HC and CO emissions, even when NO<sub>x</sub> are reduced on one line from the NO<sub>x</sub> adsorption catalyst. When the other cylinder/parallel lines are lean (regular), HC and CO can still be oxidized on the oxidation catalyst. This is not possible in the arrangement of the system in *EP '713*. Thus, as recited by the Federal Circuit in *In re Chu*, the finding of "obvious design choice" is precluded here because the rearrangement of the units disclosed in *EP '713* results in a different structure with a function that performs different from the cited art; regeneration of nitrates, sulfates and particles.

Thus, applicant asserts that the Office appears to rely upon impermissible hindsight in proposing the rejection. The stated ground of rejection in paragraph 11 of the Official Action is deficient in that it fails to state the requisite degree of motivation as to why one of ordinary skill in the art would have been motivated to modify the teachings of *EP '713* in the manner proposed. Moreover, it is clear that the stated motivation for modifying the teachings of *EP '713* has not been derived from the prior art, but rather from the applicants' own disclosure. Thus, the rejection is based upon impermissible hindsight.

For at least the above-noted reasons, the rejection is improper and should be withdrawn.

Claim 6-7, 10, 13, 21 and 31-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *EP '713* as applied to claims 1, 3-5, 8-9, 11 and 27-30 above and further in view of *Shinzawa et al.* or *DE '756* on the grounds set forth in paragraph 12 of the Official Action. The rejected claims depend either directly or indirectly from independent claim 1. However, the secondary references cited here

do not contribute to overcome the deficiencies associated with the primary reference, EP '713. Therefore, withdrawal of the rejection is respectfully requested.

**NEW CLAIM**

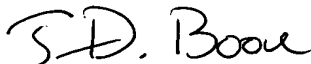
New claim 34 has been added by the present amendment. Claim 34 is patentable for generally the reasons discussed above with regard to claim 1. Support for claim 34 may be found throughout the specification and at least at claim 1.

**CONCLUSION**

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,  
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